

# **Hydrogen & Fuel Cell Technical Advisory Committee**

**April 23rd 2013**

**Patrick Valente**  
**Executive Director, Ohio Fuel Cell Coalition**

# Discussion Areas

- **Why Fuel Cells in Ohio?**
- **Ohio Fuel Cell Initiative**
- **Fuel Cell Applications**
- **Ohio Successes**

# OHIO'S FUEL CELL INDUSTRY

## Strategy

- Supply Chain
- R&D Strengths
- Work Force
- Fuel Cell Roadmap
- Cache

- Ohio Fuel Cell Coalition
- **Ohio Congressional Delegation**
- **Ohio Administrative and Legislative Support**

## Public Support

- Third Frontier
- Advanced Manufacturing Programs
- Federal Programs
- Economic Development Programs
- Company Attraction
- Point Person

## Ohio's Competitive Advantage

- **Technical support**
  - University R&D/collaboration
    - Research entities – **Case Western Reserve University, Akron University, Ohio State University, Battelle, Ohio University**
    - Federal labs– **NASA Glenn Research Center, Air Force Research Lab**
  - Community and Technical Colleges - **Stark State College, Lorain County Community College**
  - Industrial manufacturing and advanced materials expertise – **Wirenet, Magnet, Edison Welding Institute**
- **Business support**
  - **TeamNEO, Ohio Development Services Agency, Stark Development Board, Edison Welding Institute, Akron Regional Development Board, TechColumbus, Columbus2020**
  - **Ohio Fuel Cell Coalition**
- **Fuel Cell Integrators**
  - ***LG Fuel Cell Systems, TMI / Lockheed Martin, Battelle, Energy Technologies Inc., Crown Equipment***

## Ohio's Competitive Advantage

- **Fuel Cells and the Natural Gas Revolution**
- **Marcellus & Utica Shale**
- **Ohio's strength in Solid Oxide Fuel Cells**
- **Distributed Generation and Fuel Cells**
- **Supply Chain Strengths**

## Ohio's Competitive Advantage

### Supply chain

*“There is not a fuel cell manufactured  
in the U.S. that does not have  
Ohio components”*

- American Trim
- NexTech Materials
- GrafTech
- Catacel Corp.
- Die-Matic
- Gorman Rupp Industries
- AT&F Advanced Metals
- Refractories Specialties, Inc.
- Swagelok

### Supply Chain Exchange Events

- May & October 2013
- Results of Supply Chain Exchanges
- FCS&EE Supply Exchange  
October 23, 2013

# Ohio's Fuel Cell Industry



# Ohio Competitive Advantage

## Fuel Cell Patents

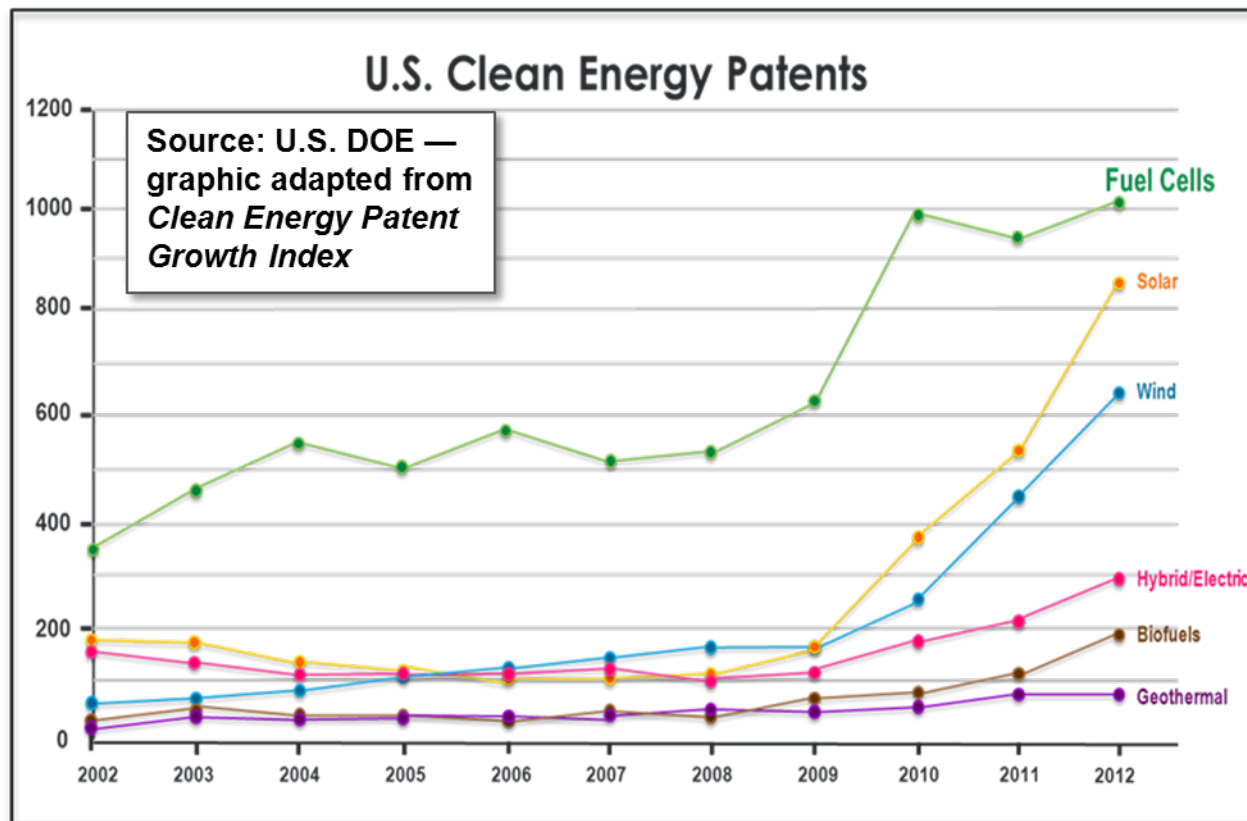
- ❑ 1995 - 97: **12** fuel cell patents granted in Ohio.
- ❑ 2005 - 07: **144** fuel cell patents granted in Ohio.

**1200%** change in a 10-yr period! (SRI report 2009)

## Fuel Cell Workforce

- In 2010, Ohio employed 9.8% of all U.S. residents who work in the fuel cell/hydrogen industry. Ohio represents 3.7% of the U.S. population, according to 2010 figures from the U.S. Census Bureau.





Clean Energy Patent Growth Index shows growth in fuel cell patents along with other clean energy technologies.

(<http://cepgi.typepad.com/files/cepgi-4th-quarter-2012.pdf>)

# Ohio's Fuel Cell Initiative

- The State of Ohio recognized the fit of fuel cells with its manufacturing base and planted the seeds to allow the fuel cell industry to flourish in the state.
- A strong partnership between the State of Ohio and the fuel cell industry through the Ohio Third Frontier Program – \$90 million in awards have been granted to industry and to research and development.
- The Ohio fuel cell industry: Has leveraged more than \$300 million of federal dollars in support of fuel cells.

# Ohio Fuel Cell Coalition

- **Mission**

- The Ohio Fuel Cell Coalition is a united group of industry, academic, and government leaders working collectively to strengthen Ohio's fuel cell industry and to accelerate the transformation of industry to **global leadership in fuel cell technology and applications**

- **Activities**

- Networking and Collaboration
- Education
- Marketing and Communications
- Advocacy
- Supply Chain Exchange Meetings

# Ohio Fuel Cell Coalition

- More than 85 members consisting of companies, universities, government entities, and non-profits/other
  - 21 member board representing all stakeholders
- Annual Ohio Fuel Cell Symposium
  - Networking, exhibitors, technical posters
  - Over 200 attendees each year

***2013 Symposium at Spitzer Center, Lorain County Community College, Elyria OH***

***2013 Fuel Cell Seminar & Energy Exposition, Columbus OH***

- [www.fuelcellcorridor.com](http://www.fuelcellcorridor.com)
  - Member and industry news
  - Advocacy, information sources

## Fuel Cells & The Natural Gas Revolution

The poster features a green background with abstract, flowing lines and several yellow dots of varying sizes. The text is centered and uses a mix of blue and black fonts.

**OHIO FUEL CELL  
SYMPOSIUM**

**May 1 - 2, 2013**

The John A. Spitzer Conference Center  
Lorain County Community College  
Elyria, Ohio

Exhibitor/Sponsorship Info:  
[pat.valente@fuelcellcorridor.com](mailto:pat.valente@fuelcellcorridor.com)

**THE FUEL CELL  
CORRIDOR**  
Global Center of the Fuel Cell Industry  
[www.fuelcellcorridor.com](http://www.fuelcellcorridor.com)

# FUEL CELL APPLICATIONS & OHIO SUCCESSES

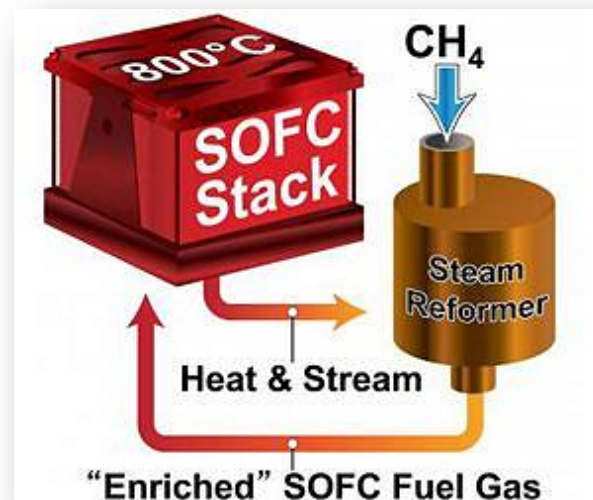
- Crown Equipment Corp. (New Bremen, OH) is a world leader in fuel cell forklifts. By the end of 2012, Crown will have 1,500 fuel cell powered lift trucks in the market.





# FUEL CELL APPLICATIONS & OHIO SUCCESSES

LG Fuel Cell Systems (formerly Rolls-Royce Fuel Cell Systems) chose to locate its worldwide fuel cell business in North Canton, Ohio. This is evidence of the benefit of the investment in the Ohio Third Frontier Project.



## FUEL CELL APPLICATIONS & OHIO SUCCESSES

Lockheed Martin (Akron) will start manufacturing military gen-sets in the next few years and create hundreds of jobs.

–Technology Management, Inc., in Cleveland, OH, is supplying the solid oxide fuel cells to Lockheed Martin.

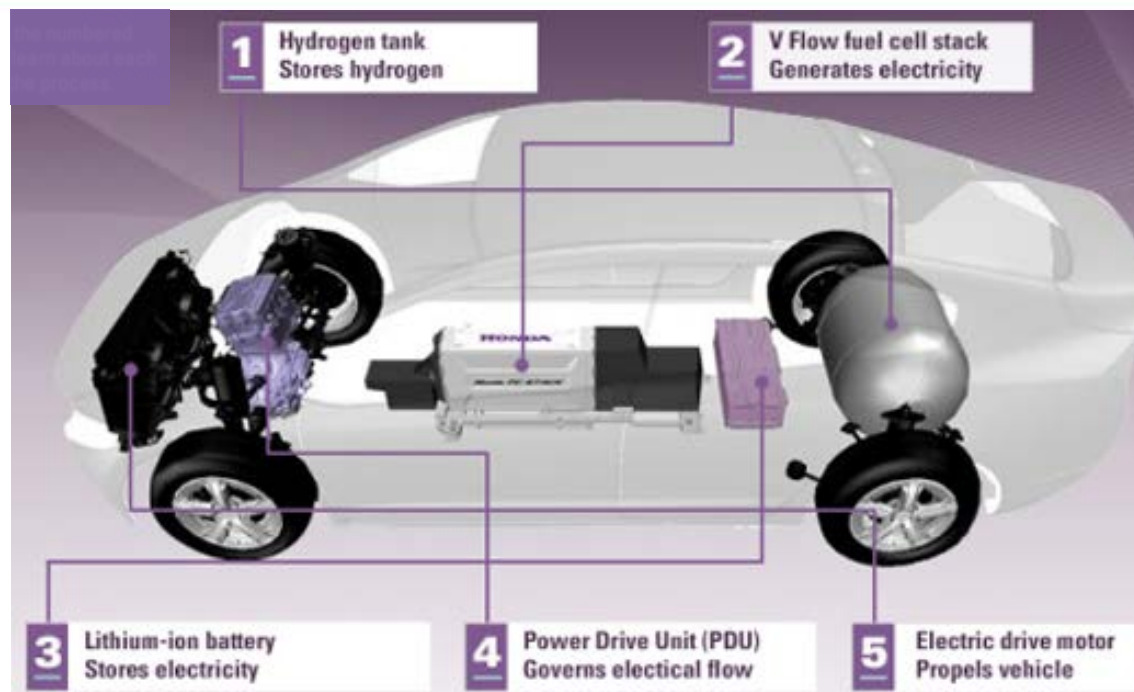




## FUEL CELL APPLICATIONS & OHIO SUCSESSES

Five of the world's largest auto makers, including Honda (Marysville, Ohio) have committed to producing commercial quantities of fuel cell passenger vehicles (FCEVs) by 2015. FCEV sales are expected to exceed 350,000 vehicles (more than \$16.9 billion) in 2020.





# OHIO'S OTHER TOP SUCCESSES

- **CSA Standards** in Independence, OH, is the leading fuel cell standards organization in the US.
- **American Trim, LLC**, Lima, OH manufactures metal bipolar plates used in PEM fuel cells and has established critical supplier relationships with the automotive industry.
- **Catacel Corporation** in Garrettsville, OH, supplies catalytic reactors and advanced heat exchangers to **Ballard** and many others.
- **NexTech Materials** in Lewis Center, OH, is an innovative leader in solid oxide fuel cell components including ceramic materials, hydrogen sensors and residential fuel cells.

## University Innovation in Ohio

- **The Ohio State University - American Trim, LLC.** American Trim is integrating manufacturing technology developed at Ohio State University to meet the fuel cell industry's need for cost effective high quality parts.
- **The Ohio State University & DJW Technology, LLC** are developing membrane fabrication capability at OSU and is being integrated into a prototype fuel clean-up system .
- **Stark State & LG Fuel Cell Systems** have partnered to train and employ fuel cell technicians; the result is an integrated college -private sector partnership on fuel cell education.

## State of the Industry Looks Bright!

- The industry in 2010 boasted an estimated \$1 billion in revenue and more than 25,000 skilled employees worldwide.
- Fuel cells are one of the fastest growing clean energy sectors, with 10.3% annual growth. Fuel cell shipments overall increased by 40% in 2010 compared to 2009. As per reports, fuel cell shipments are expected to increase by 71% from 2010 to 2013.
- Ohio companies are participating in this rapid growth through sales of critical components as well as through original equipment development and demonstration.
- We need to continue the investment in the fuel cell industry. We are on the verge of considerable success and we need to stay the course.



# 2013 Fuel Cell Seminar & Energy Exposition



October 21 -24

Greater Columbus  
Convention  
Center

Columbus, Ohio

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